# Integrated Energy and Communication Systems Architecture (IECSA) Project Overview and Status

Presentation to Department of Energy Project Review

October 28, 2003

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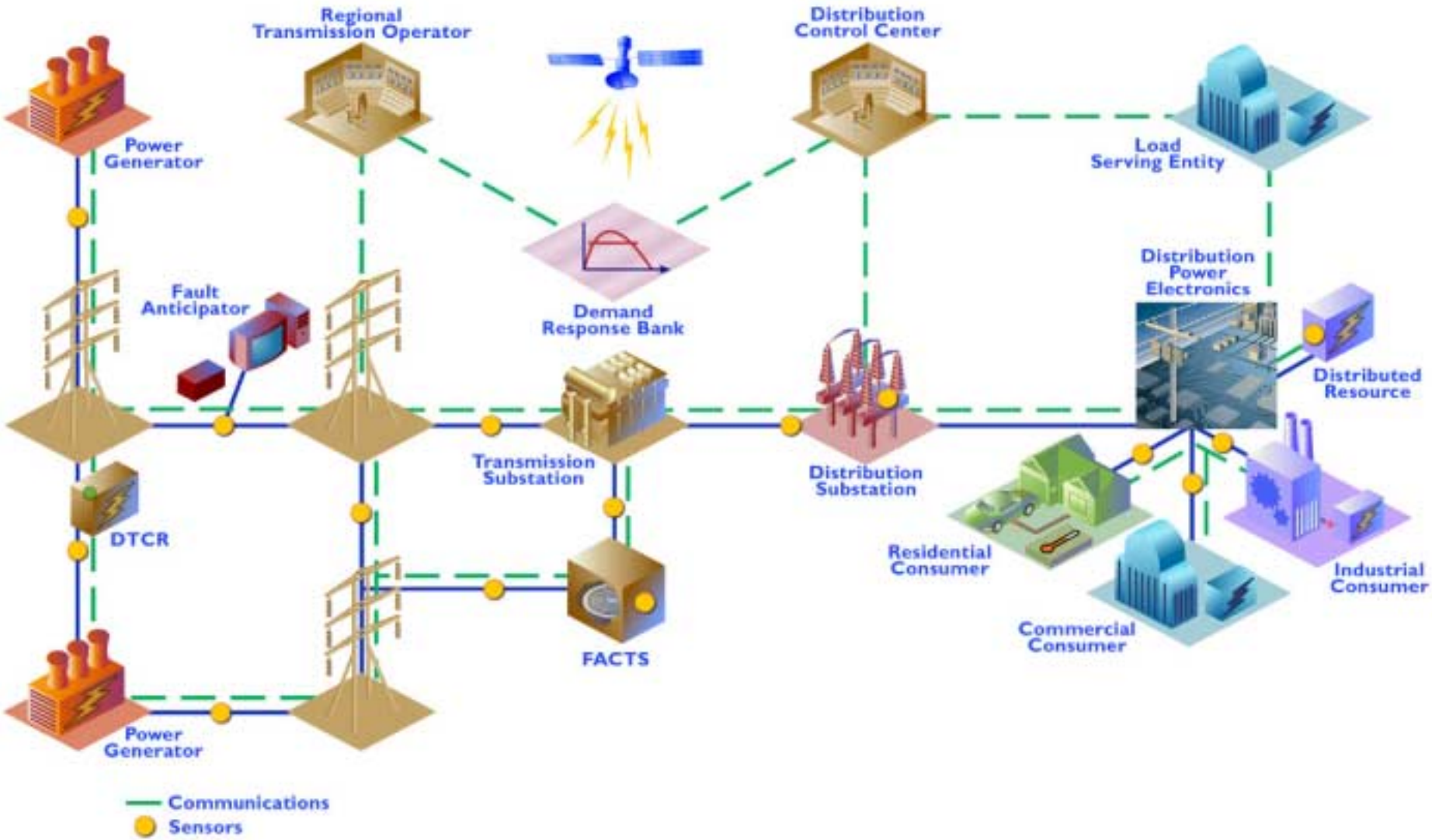
EPRI

Electricity Innovation Institute

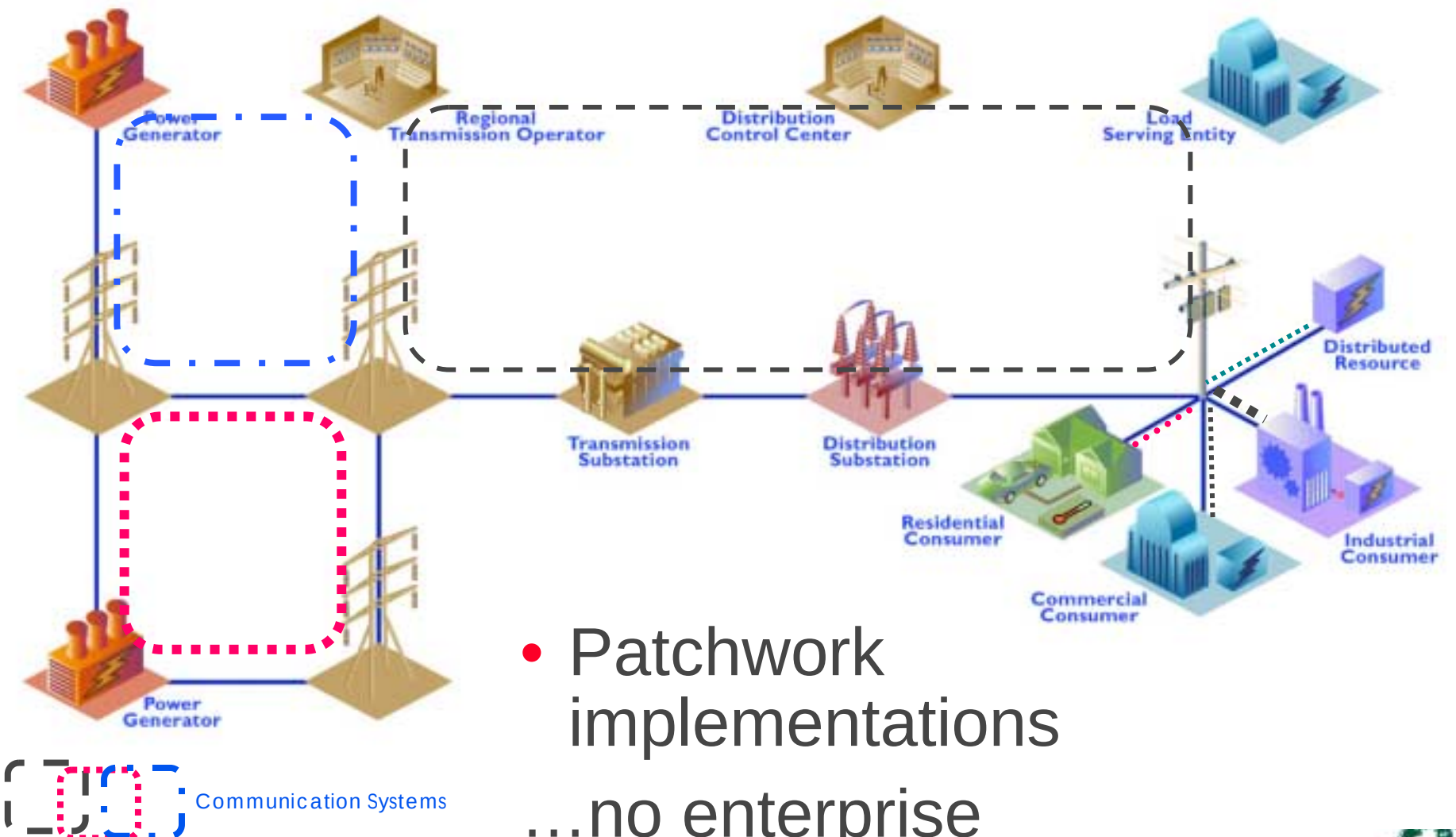
# Purpose of the Presentation

- Provide project drivers and overview
- Present project approach and status
- Projecting work to come in 2004 and beyond

# Energy industry Vision of a Future:



# Future Without an Architecture:




- Patchwork implementations

…no enterprise architecture…

# Technical Challenges of Current Practices (in addressing the identified problems/needs)

- Proprietary products and implementations are often purchased that have limited ability to integrate with other vendor products=>”Stovepipe implementations”
- Necessary requirements such as key security and management functions are not available or incomplete
- Significant substantive work within Standards organizations is not complete and work is fragmented
- No industry architecture for integrating on large scales
- Systems Engineering practices are often not followed

# IECSA Project relevance to industry needs

## Energy Industry Need

- Inability to integrate vendor equipment for advanced automation on high levels
- Inability to connect consumers to markets…price inelacticity
- No complete architecture for large scale integration across the enterprise or industry
- No complete approach to implement security policies over the industry

## IECSA Project Response

- Develop an industry architecture and open standards based on stakeholder requirements
- Develop an architecture for connecting consumers to markets
- Develop a robust approach that specifically addresses architecturally challenging topics
- Develop security and management in parallel with energy applications

# Project Objectives

- Develop an open systems based industry-level architecture for advanced energy industry automation and consumer communications
- Develop a robust set of industry technical requirements through interaction with key stakeholder communities
- Build upon existing and emerging industry standards and develop useful contributions to key standards communities
- Apply the latest tools and methods for developing and rendering the architecture in both narrative and graphical forms

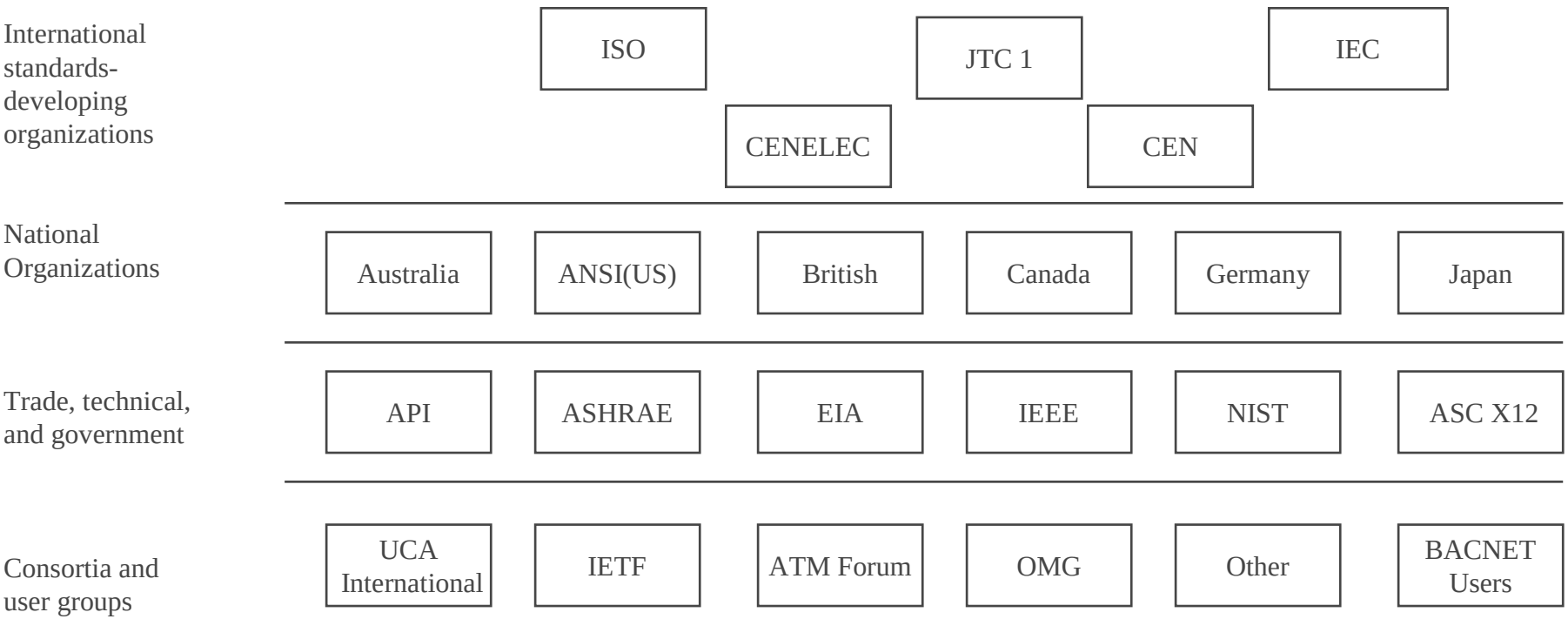
# Technical Approach: General

- Develop an overall industry-wide architecture for advanced automation and communications with consumers
- Use Power Engineering and Systems Engineering as the base disciplines
  - Power Engineering source of functional requirements
- Use the body of knowledge within existing and emerging open standards to establish a vendor neutral approach to advanced distributed computing
- Use standardized language and notation for project documentation and architectural rendering

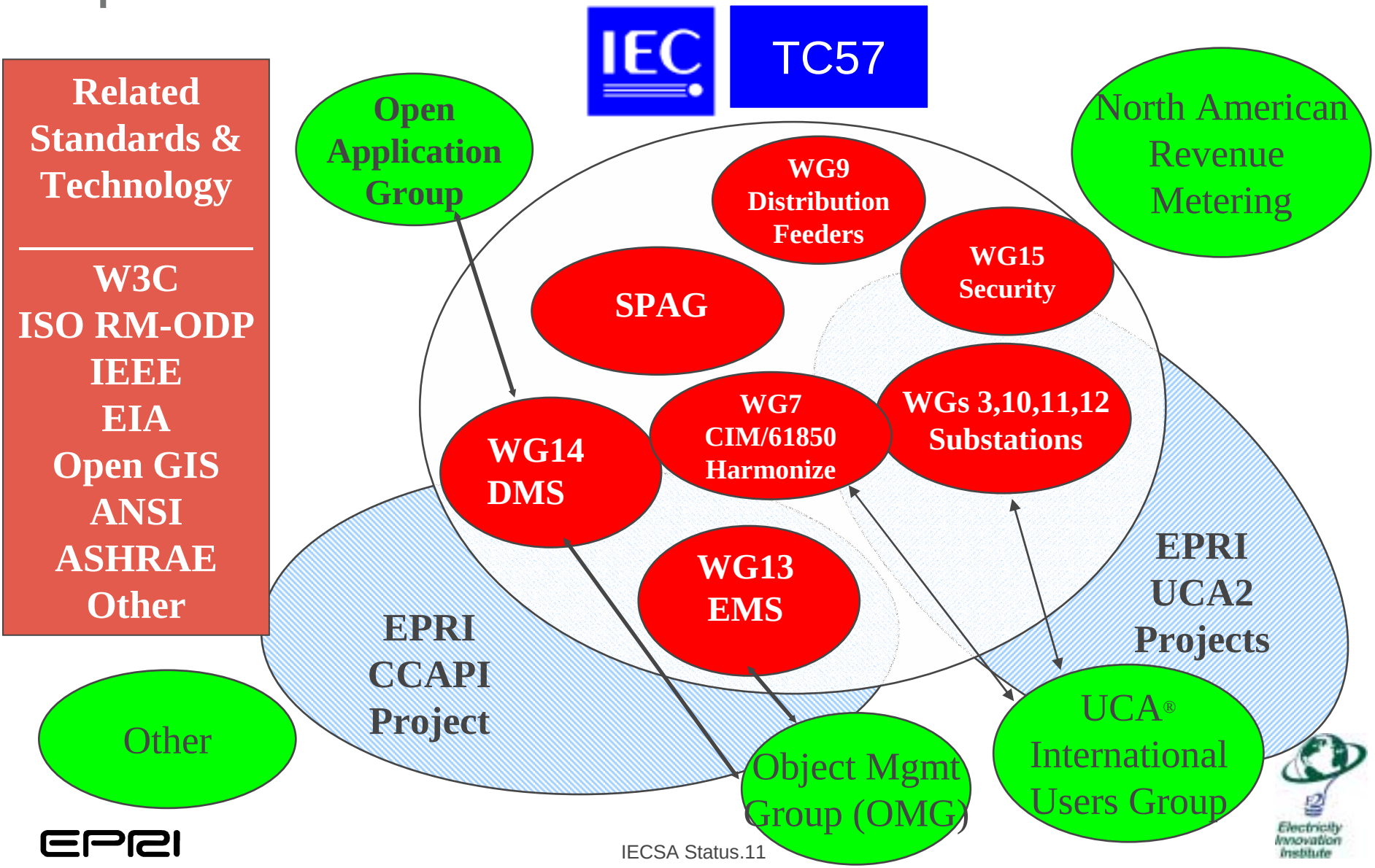
# Technical Approach: Why Develop an industry Architecture?

- Body of knowledge…
- Necessary to manage complexity
- More completely and accurately link business models, drivers and stakeholders with supporting technical development processes
- Provides approaches to capture vision and “views from a height”
- Enables understanding of synergies/problems that lower level views miss
- A primary approach for establishing and implementing security policies across the enterprise/industry

# Technical Approach: Build upon key Standards-Developing Organizations and Consortia



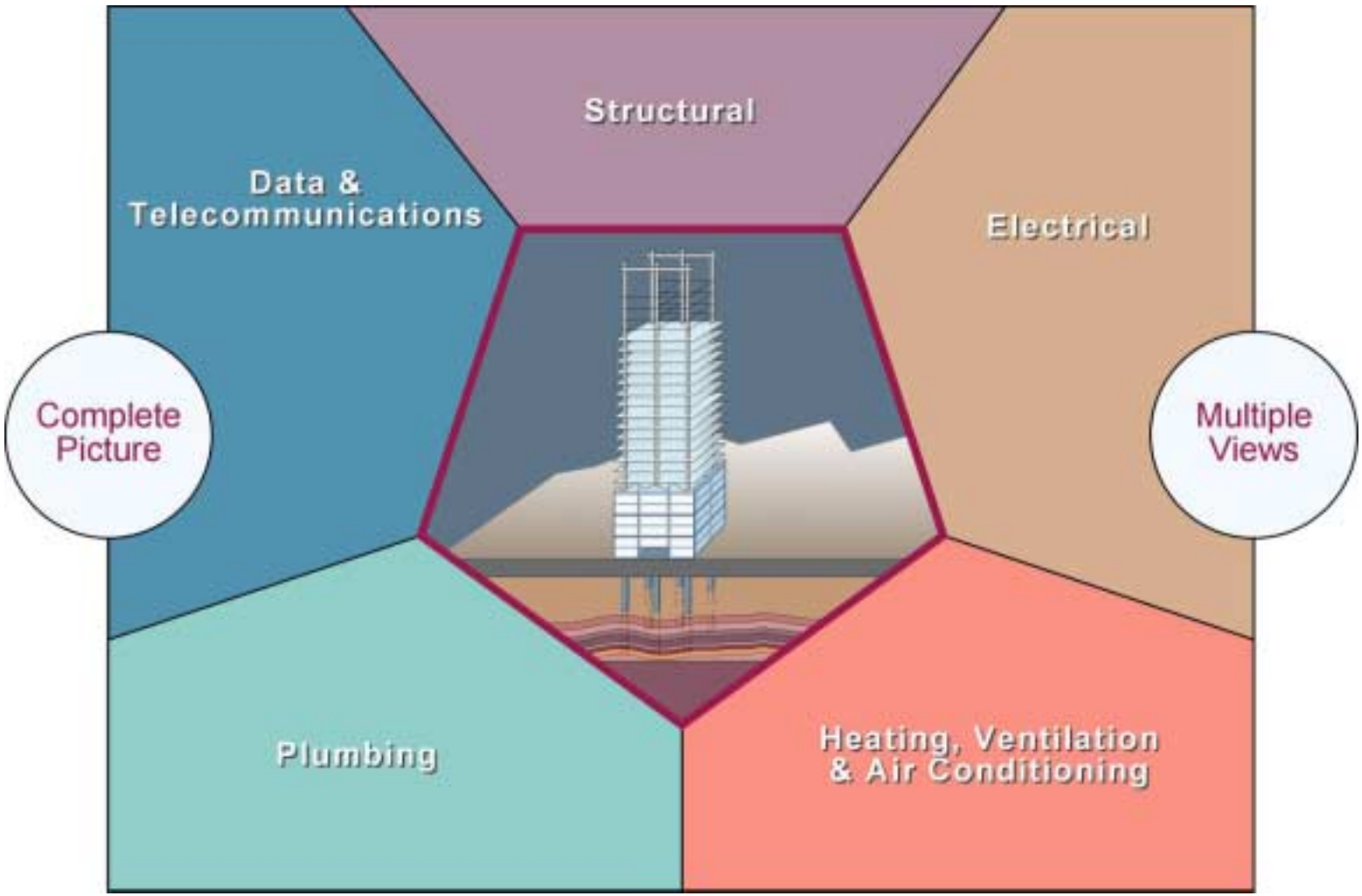
# International Electrotechnical Commission (IEC) TC 57 and other industry Standards



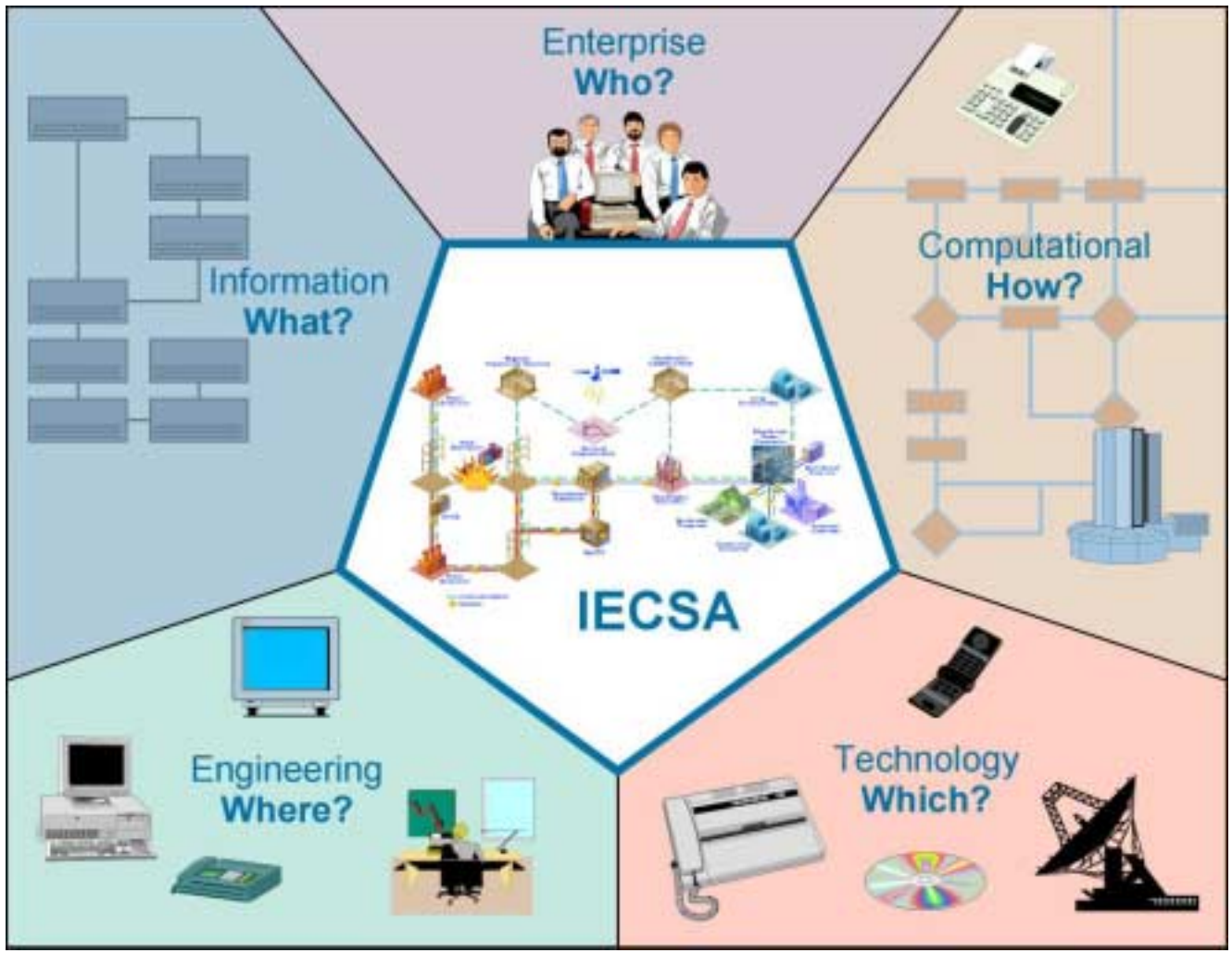
# What is An Integrated Energy and Communications System Architecture (IECSA)?

IECSA is an open, standards-based set of blueprints for integrating the data communications networks and intelligent equipment necessary to support the power delivery infrastructure of the future.

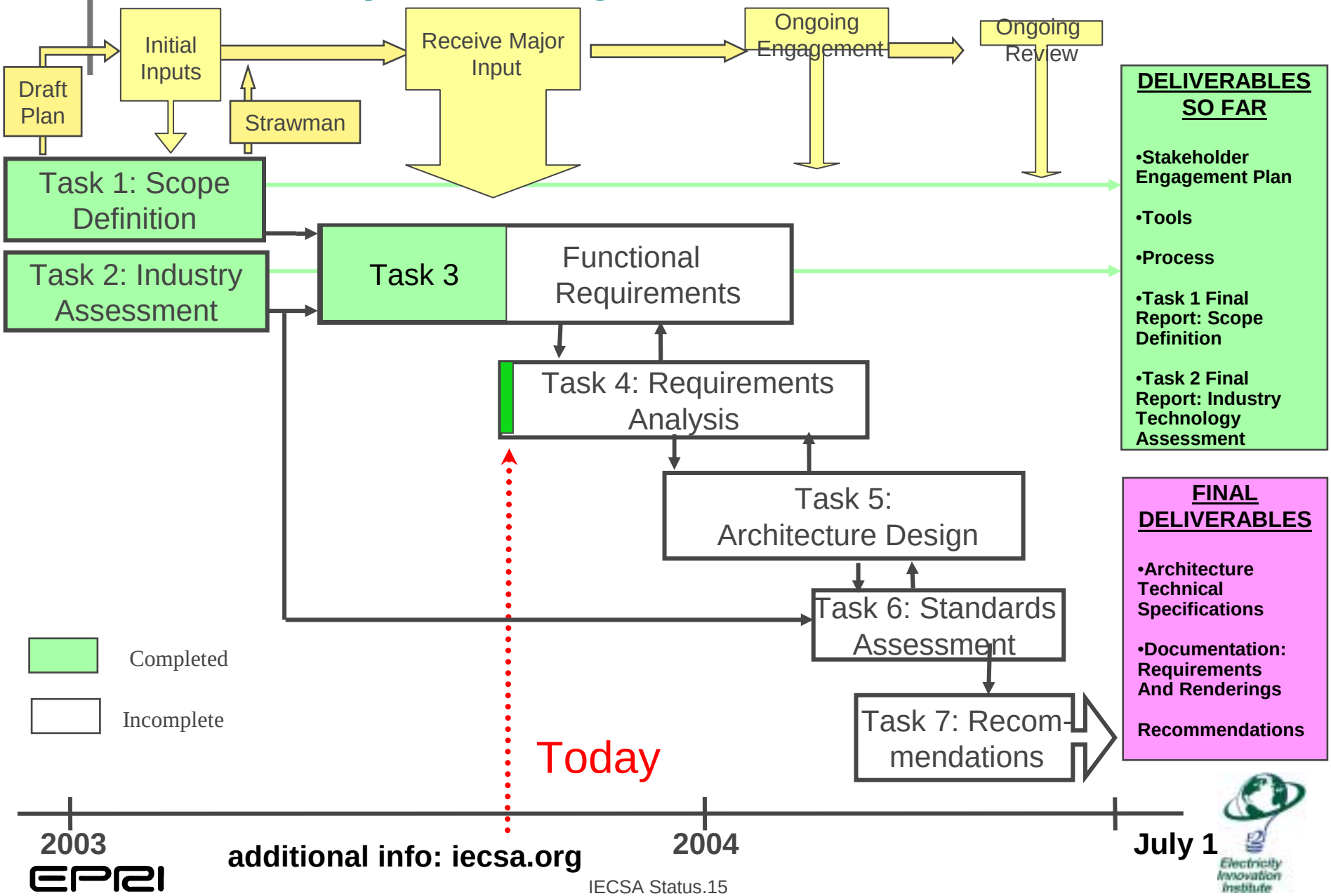
# What Information Should the Blueprints for a Complete Building Architecture Contain?



# IECSA Project Applies ISO 10746 (RM-ODP) Architecture Framework and Unified Modeling Language Notation



# IECSA Project Lifecycle timeline




**DELIVERABLES SO FAR**

- **Stakeholder Engagement Plan**
- **Tools**
- **Process**
- **Task 1 Final Report: Scope Definition**
- **Task 2 Final Report: Industry Technology Assessment**

**FINAL DELIVERABLES**

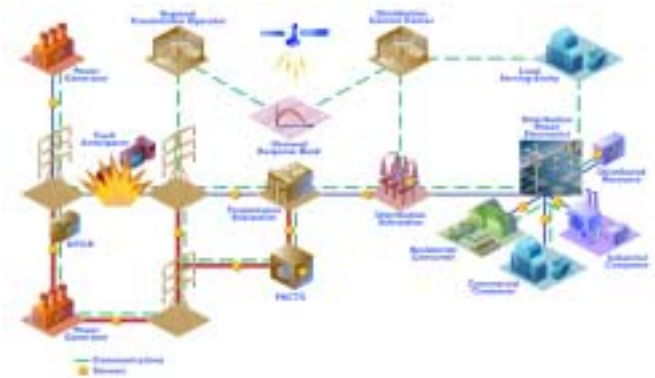
- **Architecture Technical Specifications**
- **Documentation: Requirements And Renderings**
- **Recommendations**

**additional info: iecsa.org**

# FY03 Progress and Accomplishments

- Completed initial descriptions for more than 400 Advanced Energy Industry Automation Applications and evaluated for architectural significance
- Completed an Initial Industry Infrastructure Assessment
- Tools and Methods Evaluated and Selected
  - Architectural framework selected: Reference Model for Open Distributed Processing (ISO 10746)
  - Computer aided systems engineering (CASE) tool selected and adopted
  - Developed methods to apply standardized notation (unified modeling language) to the framework

# Application Domains and Enterprise Activities



**CEIDS Vision of the Future**

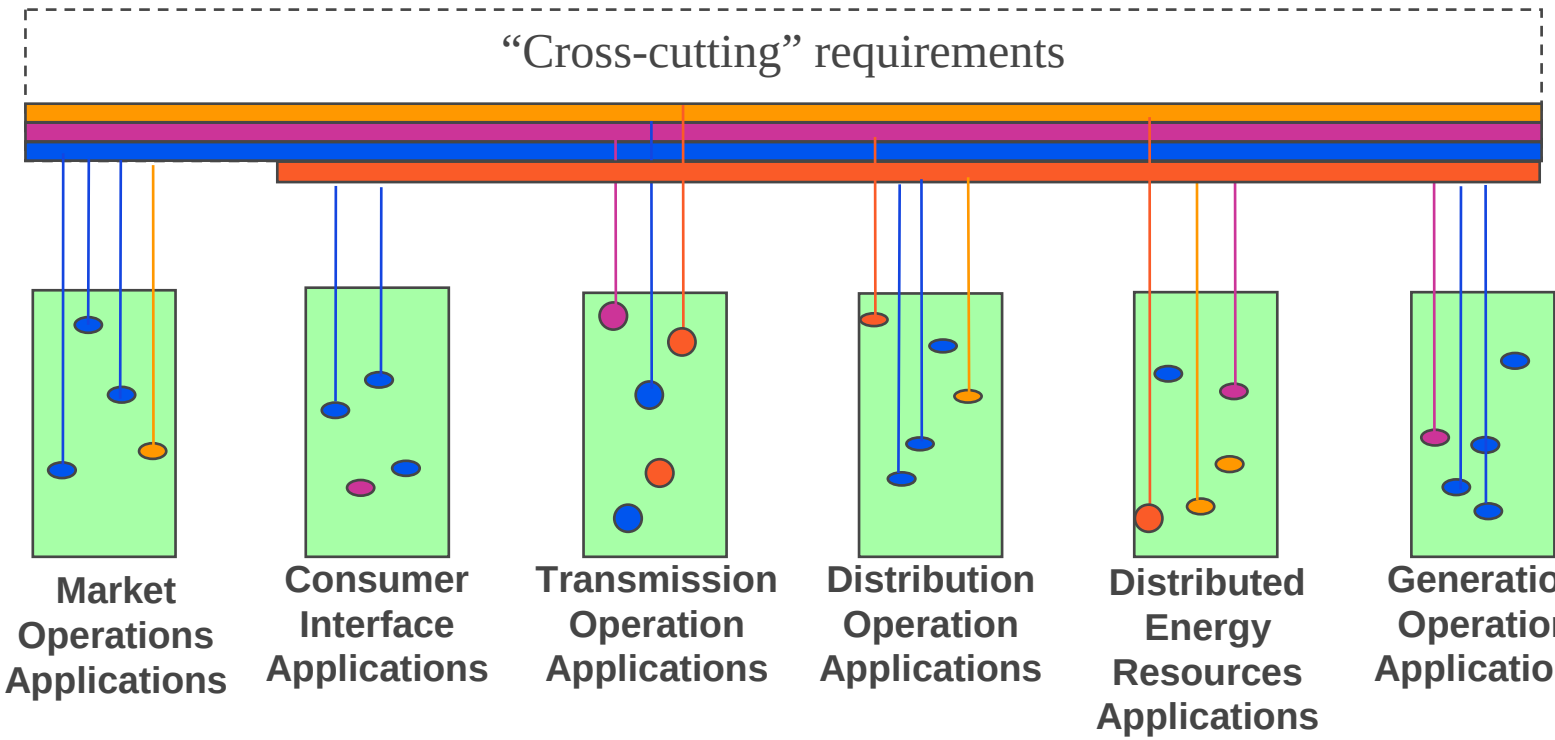
**Application Domains**

Transmission | Distribution | Consumer Services | Market Operations | Generation | DER | Federated Services

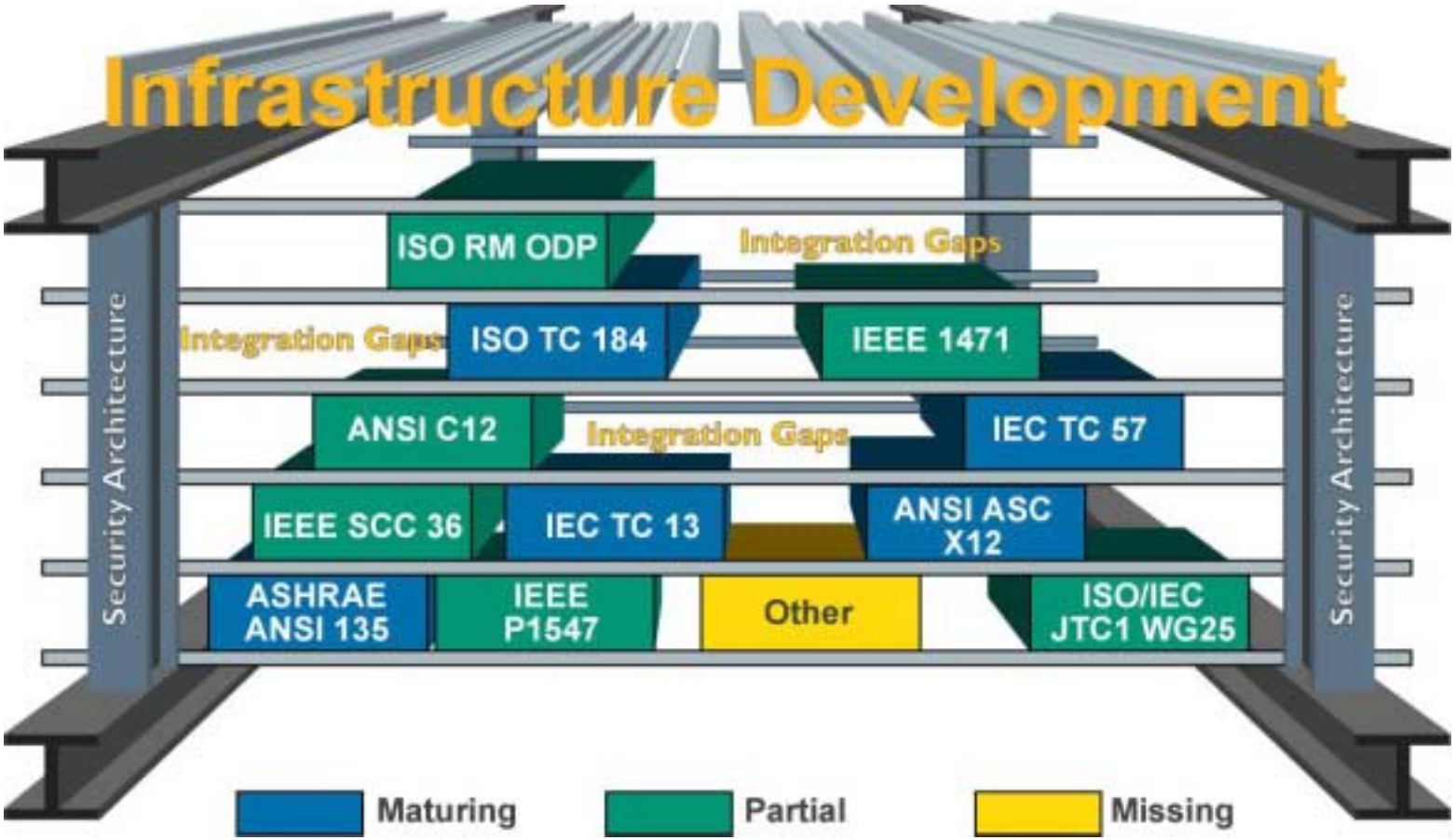
**Enterprise Activities**

# IECSA Focus on Enterprise and Industry-Wide Data Communications and Distributed Computing Architecture

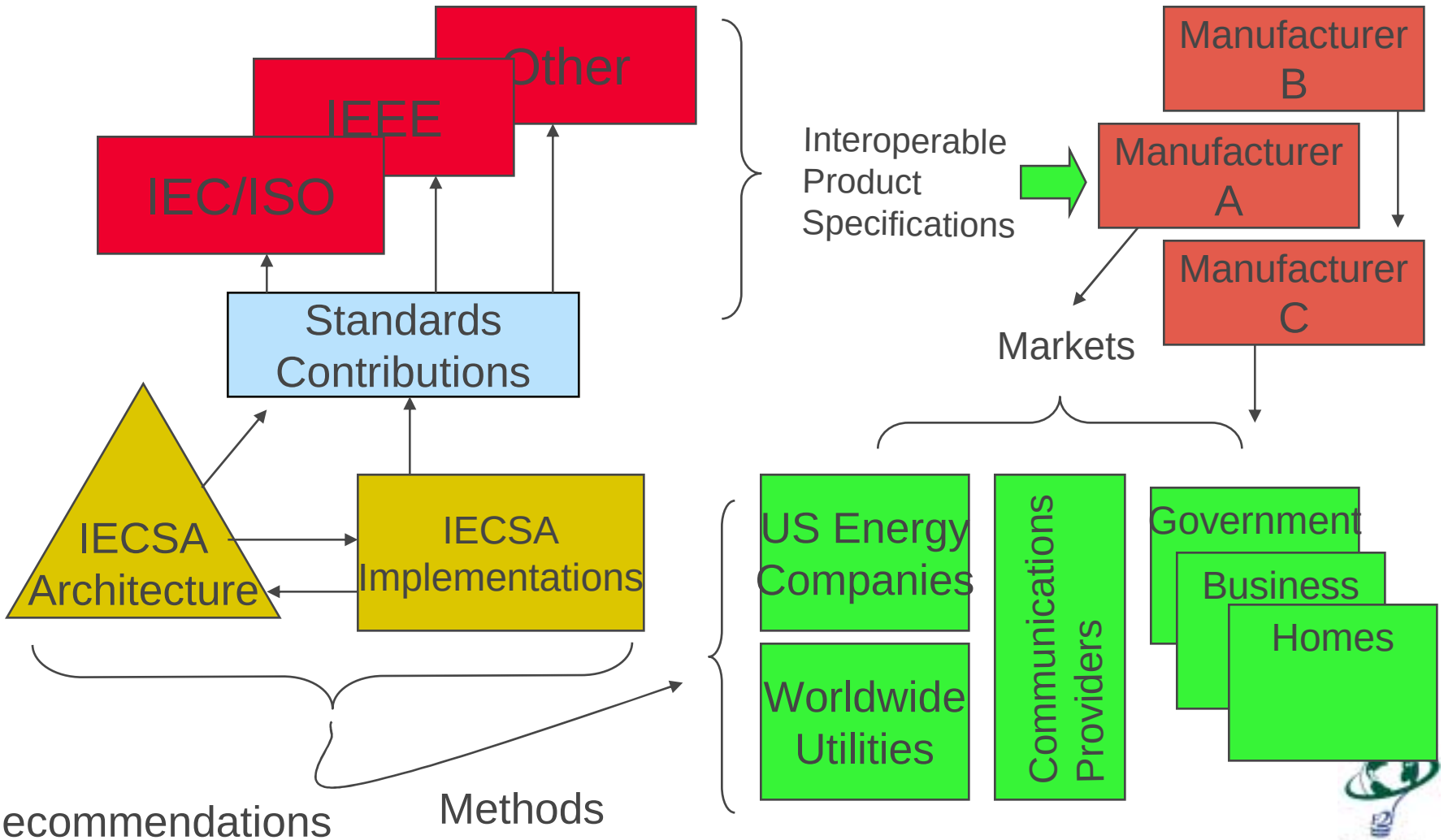
**Enterprise Security Policy**
**Common Data models**
**Network and Systems Management**
**Fast simulation and modeling**



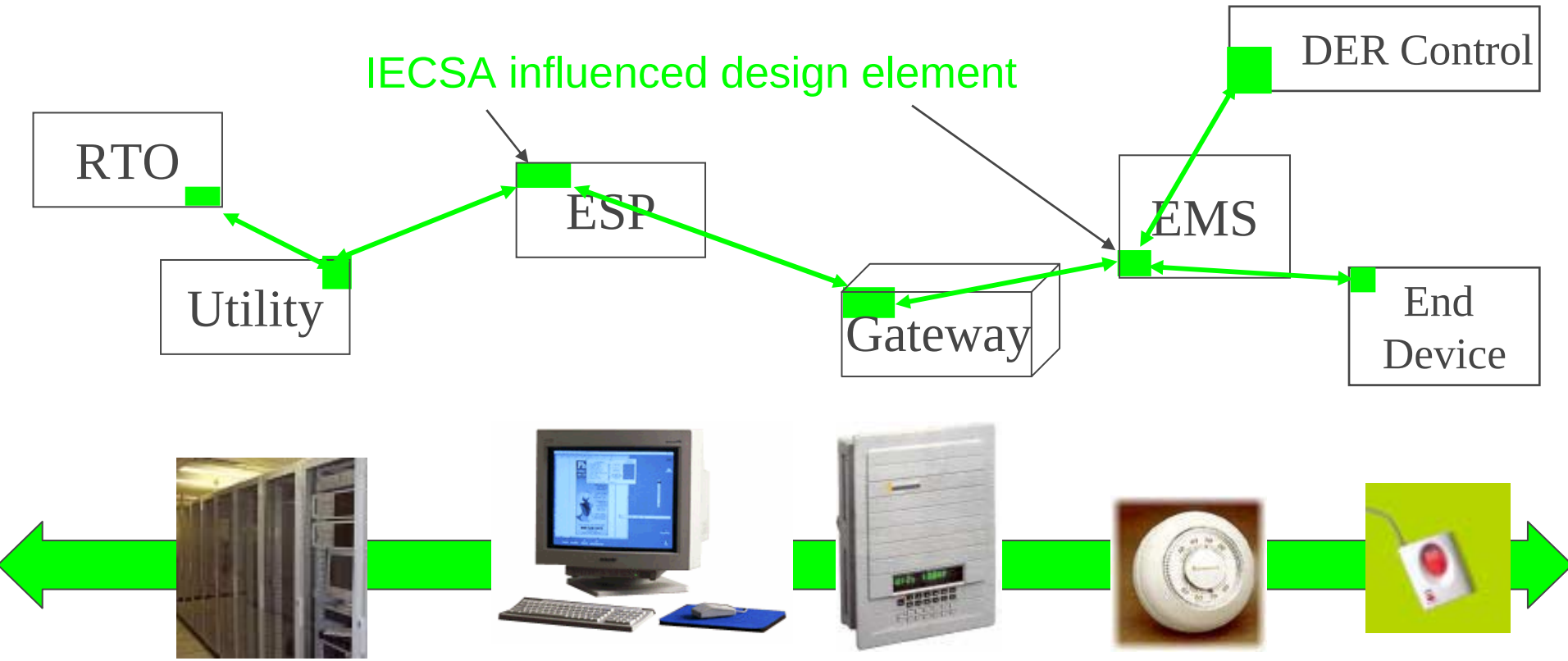
# Task 2: Industry Assessment of Current Infrastructure Development (Sample)



# Pathway to Commercial Implementation



# IECSA Potential Influence



# FY03 Progress and Accomplishments Continued

- Requirements Development Processes Initiated
  - Stakeholder Engagement Plan Developed
    - Ten categories of stakeholders identified
  - In-depth Analyses in three key initial areas initiated
    - Wide Area Measurement and Control (Transmission)
    - Advanced Distribution Automation/Integrated DER
    - Consumer Communications/Real-Time Pricing
  - Initial engagements conducted with small groups

# IECSA Major Deliverables, Schedule and Budget

| Major Deliverable | Schedule | Budget ($000) |
|---|---|---|
| Application Descriptions Scoping/ Industry Assessment | May 15, 2003 | $1050 |
| Functional Requirements | Feb 30, 2004 | $1250 |
| Proposed Industry Architecture | May 30, 2004 | $1100 |
| Final Report and Recommendations | June 30, 2004 | $600 |
| Total Completion | June 30, 2004 | $4000 |

# Planned Activities for FY 2004

- Complete Requirements Development
- Requirements analysis and architecture Rendering
- Develop Proposed industry architecture
- Develop contributions to key Standards organizations
- Develop Recommendations for follow-on work to complete the technical areas that remain undeveloped

# Impacts and Benefits

- Impact on ***What*** can be accomplished with advanced automation
  - Enable new applications to enhance power system management: self diagnosing, self healing, self optimizing power delivery,
  - Enable improved DER integration and managed islanding
  - Connect consumers to markets and enable demand response through communications with consumer equipment
- Impact ***How*** this is done: Enable multi-vendor procurement and integration of advanced automation equipment from many vendors through advancing open systems standards
- Enable implementation of consistent security policies over the energy industry

# Summary of out-year activities

- Technical development of key industry standards
  - Harmonization and coordination between initiatives
  - Development of infrastructure elements that are missing
  - Continued development of contributions to key standards organizations as necessary
- Evaluation and codification of the architecture through simulation and specific implementations in real world equipment
  - Laboratory environments
  - Demonstrations leading to large scale implementations

# Interactions and Collaborations

- Stakeholder Engagement is planned for all major tasks
- Ten categories of stakeholder communities identified: Utilities, Regulators, Vendors, Government, ISO's/RTO's, Consumer Groups, Research Communities, others
- Planned integration with key standards International development communities
- Standardized notation and systems engineering approach assists in sharing documentation among related projects
- Participation and interest is cross industry and International: European utilities as well as US.
- Integration with Federal Architecture Development

# Contact Information

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